

File NR: G2-29981
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State of Washington REPORT OF EXAMINATION FOR WATER RIGHT APPLICATION

APPLICATION PRIORITY DATE
April 16, 2001

WATER RIGHT NUMBER
G2-29981

MAILING ADDRESS
Clark Public Utilities
PO BOX 8900
Vancouver, WA 98668

SITE ADDRESS (IF DIFFERENT)
5806 NW Fruit Valley Road
Vancouver, WA

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
25,000	GPM	20,000

Purpose

PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON- ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Municipal Supply	25,000		GPM	20,000		Year round

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Clark	Pleistocene Alluvial Aquifer (PAA)		28 - Salmon Washougal

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Wellfield	147353000							
	147361000							
	147361010	-	2N	01E	9 & 16		45.666094 N	122.692705 W
	147361005							
	147383000							

Datum: WGS84

The proposed wellfield will be located on a 22-acre site off Fruit Valley Road, approximately one-half mile south of Vancouver Lake. The site is located on Parcel #s 147353000, 147361000, 147361010, 147361005 and 147383000, located in SE 1/4 of Section 9, NW 1/4 of Section 16, SW 1/4 of Section 9, NE 1/4 of Section 16, all in T2N R1E, WM. A building on Parcel 147353000 is addressed 5806 NW Fruit Valley Road, Vancouver, Washington. Clark Public Utilities (CLARK) currently owns the site for the wellfield.

Place of Use

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

The place of use (POU) of this water right is the service area described in the most recent Clark Public Utilities Water System Plan approved by the Washington State Department of Health, so long as the water system is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Proposed Works

The application requests 25,000 gpm of instantaneous supply and 20,000 ac-ft/yr of annual supply from up to eight supply wells that would be completed in the Pleistocene Alluvial Aquifer (PAA) at depths of less than 200 feet. The water would be used on a year-round basis for municipal supply in the area served by CLARK as described in the water system planning documents. The supply will also provide water to the cities of Battle Ground and Ridgefield through system interties. The wellfield will be designed to meet the 50-year growth projections for all three entities.

The project will include construction of a wellfield supply source, water treatment facility, and transmission line that would interconnect the source to existing CLARK facilities. Future engineering studies will be used to assess the transmission line route and configuration as well as the location of the treatment plant.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Begun	June 1, 2030	June 1, 2050

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually (by January 31)
What volume should be reported?	Total Annual Volume (ac-ft/yr)
What rate should be reported?	Weekly Peak Rate of Withdrawal (gpm)

Provisions

Measurements, Monitoring, Metering and Reporting

An approved measuring device shall be installed and maintained for the source identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173, which describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements.

Ecology is requiring the recording and reporting of meter data as described above to collect seasonal information for water resource planning and compliance.

Water use shall be recorded weekly. Recorded water use data may be submitted via the Internet. To set up an Internet reporting account, contact the Southwest Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Southwest Regional Office for forms to submit your water use data.

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times to the project location, and will be allowed to inspect, at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems to ensure there is compliance with the law.

Proof of Appropriation

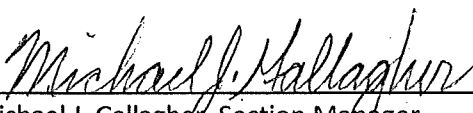
The water right holder shall file the notice of Proof of Appropriation of water when the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent of the project perfected within the limitations of the permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated.

Therefore, I ORDER approval of Application No. G2-29981, subject to existing rights and the provisions specified above.

Signed at Olympia, Washington, this 21ST day of September 2012.


Michael J. Gallagher, Section Manager

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of the Order.

File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.
- You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW Ste 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: <http://www.eho.wa.gov>. To find laws and agency rules visit the Washington State Legislature Website: <http://www1.leg.wa.gov/CodeReviser>.

BACKGROUND

CLARK filed water right application G2-29981 for a permit to appropriate public groundwater from a proposed wellfield source located near Vancouver Lake in southwest Clark County, Washington. The permit was filed on April 16, 2001 but holds an August 13, 1986, priority date associated with the Clark County Reservation. The application requests 25,000 gallons per minute (gpm) of instantaneous supply and 20,000 acre feet per year (ac-ft/yr) of annual supply from up to eight supply wells that would be completed in the PAA at depths of less than 200 feet. The water would be used on a year-round basis for municipal supply in the area served by CLARK.

The proposed wellfield site, known as the South Lake Wellfield, is located on property owned by CLARK at 5806 Fruit Valley Road, Vancouver, Washington. The site is located in Sections 9 and 16, Township 2 North, Range 1 East Willamette Meridian. The site consists of five separate parcels totaling about 22 acres. The topography of the site gently slopes to the west between elevations 25 and 45 feet above mean seal level (msl).

CLARK's South Lake Wellfield property already contains several deep production wells permitted under groundwater permit G2-30381. CLARK proposes to rely on its existing deep production wells completed in the deep Sand and Gravel Aquifer (SGA) until 2020 and then to include use of the PAA wells proposed under this application.

Table 1 – Application Summary

Attributes		Summary
	Name	Clark Public Utilities
	Date	April 16, 2001
	Instantaneous Quantity	25,000 gpm (additive)
	Annual Quantity	20,000 afy (additive)
	Points of Withdrawal	Up to 8 supply wells
	Purpose of Use	Municipal Supply
	Period of Use	Year round, as needed
	Place of Use	Clark Public Utilities approved water service area

Legal Requirements for Approval of Appropriation of Water

The following requirements must be met prior to authorizing the proposed water right:

- **Public Notice**
Public notice of the application must be published in a local legal record of notice. There is a 30-day public comment period. A public notice of this application was published in The Columbian newspaper December 12th and 19th of 2002. Four comments were received and addressed.
- **State Environmental Policy Act (SEPA)**
The subject water right application is subject to SEPA because the instantaneous quantity is greater than the 2,250 gallons per minute threshold. Clark Public Utilities as lead agency has reviewed the proposed project under the provisions of the State Environmental Policy Act (SEPA). It has determined that the proposal will not have a significant adverse impact on the environment and, therefore, an environmental impact statement is not required under RCW 43.21C.030(2)(c). This determination of non-significance (DNS) was issued under WAC 197.11.340(2) on March 22, 2002.
- **Water Resources Statutes and Case Law**
Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights. Laws governing the water right permitting process are contained in RCW 90.02.250 through 90.03.050. In accordance with RCW 90.02.290, determinations must be made on the following four criteria in order for an application for water rights to be approved:
 - a) Water must be available;
 - b) There must be no impairment of existing rights;
 - c) The water use must be beneficial; and
 - d) The water use must not be detrimental to the public interest

INVESTIGATION

This investigation included, but was not limited to, research and/or review of the following:

- Records of water rights and well logs in the vicinity of the site from Ecology well database.
- Notes from the site visit on June 1, 2012.
- Vancouver United States Geological Survey (USGS) 7.5 minute topographic map.
- Ash Creek Associates, 2011. 2011 Interim Action Work Plan NuStar Vancouver Facility, Vancouver, Washington. Prepared for NuStar Terminals Services, Inc. dated March 25, 2011.
- Ecology, 2008. Responsiveness Summary, ST Services NuStar Energy LP, August 18 - September 18, 2008, Public Comment Period, Agreed Order for Remedial Investigation and Feasibility Study. Prepared by Washington State Department of Ecology Southwest Regional Office Toxics Cleanup Program. Dated November 2008.

- Mundorff, M.J. 1964. Geology and Ground-Water Conditions of Clark County Washington, with a Description of a Major Alluvial Aquifer along the Columbia River. USGS Water-Supply Paper 1600.
- Swanson and others, 1993. A Description of Hydrogeologic Units in the Portland Basin, Oregon and Washington. USGS Water Resources Investigation Report 90-4196.
- McFarland and Morgan, 1996. Description of the Ground-Water Flow System in the Portland Basin, Oregon and Washington. USGS Water Supply Paper 2470-A.
- Pacific Groundwater Group, 2008. Technical Information in Support of Clark Public Utilities South Lake Wellfield, Water Right Application G2-30381. Prepared for Clark Public Utilities. January 8, 2008.
- Pacific Groundwater Group, 2009. Hydrogeologic Evaluation for Clark Public Utilities South Lake Wellfield SGA Production Wells PW-2 and PW-3. Prepared for Clark Public Utilities. June 2, 2009.
- Pacific Groundwater Group, 2012. Clark Public Utilities Water Right Application G2-29981 South Lake PAA Wellfield Phase 1 Report. Prepared for Clark Public Utilities. March 7, 2012.
- Parametrix, S.S. Papadopoulos & Associates, Pacific Groundwater Group and Keta Waters, 2008. Vancouver Lake Lowlands Groundwater Model Summary Report. Prepared for Port of Vancouver and Clark Public Utilities.

Project Description

Site and New Source Description

Hydrogeologic/Hydrologic Assessment

The proposed wellfield lies within the Portland Basin. The basin encompasses the cities of Portland, Oregon, and Vancouver, Washington, and extends over an area of about 900 square miles. The basin is filled with approximately 1,400 feet of lacustrine and fluvial sedimentary deposits; these deposits are the primary source of groundwater in the region.

The hydrogeologic framework for the project site established by Pacific Groundwater Group (2008, 2012) is based on earlier work by Mundorff (1964), and the Portland Basin study project (Swanson 1993; McFarland and Morgan 1996). The project site is located within the Vancouver Lake Lowland and the Columbia River floodplain.

The hydrostratigraphy of the Vancouver Lake Lowlands can be divided into the upper and lower sedimentary systems. The production zone for the South Lake Wellfield, the Pleistocene Alluvial Aquifer, belongs to the upper sedimentary system. A basin wide aquitard, referred to as Confining Unit 1 or CU1, divides the regionally extensive upper and lower sedimentary sequences and aquifer systems. Detailed descriptions of the key hydrostratigraphic units in the upper sedimentary system are presented below.

- **Recent Alluvium (RA).** The Recent alluvium deposits from the Recent Alluvial Aquifer (RAA), which is the uppermost aquifer in the area. The Recent alluvial deposits within the Vancouver Lake Lowlands consist primarily of relatively fine-grained silts and sands, which are typically 30 to 60 feet thick but may reach thickness closer to 200 feet near the existing Columbia River channel. These deposits contain two subunits. The upper subunit, about 20 to 40 feet thick, is composed of silt and silty fine sand with abundant organic matter. The lower subunit consists of

cleaner fine sand with minor gravel and is generally thicker than the silt subunit. Both subunits appear to extend over most of the lowlands but may be locally absent in some areas. The RAA is unconfined with water levels typically occurring within 10 to 20 feet of ground surface. The RAA is in direct hydraulic continuity with surface water bodies such as the Columbia River and Vancouver Lake. Because of its relatively low permeability, this aquifer is not an important water supply source.

- **Pleistocene Alluvium (PA).** The Pleistocene Alluvium forms the Pleistocene Alluvial Aquifer (PAA), which serves as an important municipal and industrial supply source in the Vancouver Lake Lowlands. The Pleistocene alluvial (PA) deposits are a result of catastrophic flood events of the Columbia River during the last ice age (12,000 to 16,000 years ago). Sometimes referred to as the "Missoula" or "Bretz" flood deposits, these sediments are about 150 feet thick at the site. They consist primarily of sand, gravel and cobbles with variable amounts of silt. The permeability of the Pleistocene alluvial deposits is variable and depends on the processes that occurred during their deposition during the Missoula flood events. Very coarse sand, gravel and cobble deposits were laid down in the Vancouver Lake Lowlands and within flood channels that crossed through the Vancouver area. The coarsest deposits occur along the current channel of the Columbia River, the Vancouver Lake Lowland, and below the upland that extends from Orchards to Vancouver. Further north of Vancouver, fine-grained deposits consisting largely of silt and fine sand were laid down in lower energy backwater environments. This unit is about 100 to 300 feet thick in the upland areas near Vancouver. Within the Vancouver Lake Lowland, the unit appears to vary from about 150 feet near the South Lake wellfield to about 50 feet along the west side of Vancouver Lake. The PAA underlies the RAA in the Vancouver Lake Lowlands. Testing at the South Lake wellfield site indicated that the PAA is confined and has relatively high transmissivity.
- **Troutdale Formation (TF).** The Troutdale Formation underlies the PAA deposits and has been divided into various stratigraphic and hydrostratigraphic units by previous investigators (Mundorff, 1964; Swanson and others, 1993). The coarse-grained upper Troutdale is a separate unit from the lower, finer grained units that underlie Confining Unit 1. The upper unit, which includes the coarse-grained sediments of the Upper Troutdale formation described by Mundorff (1964), is the most extensive deposit in the Portland basin (PGG, 2008). Consisting of cobbly sand, gravel, and varying amounts of silt, this unit often contains considerable cementation, which reduces its capacity to transmit water. It is approximately 100 to 300 feet thick within the project vicinity. Water-bearing zones within the upper gravel unit form the Troutdale Gravel Aquifer (TGA). This aquifer underlies the Pleistocene Alluvial Aquifer. In areas where the upper Troutdale has been severely weathered, a confining zone may occur between these two aquifers. The degree of hydraulic separation depends on the local permeability of this confining unit. In the Vancouver Lake Lowland vicinity, the confining unit has a moderately high permeability, and heads in both aquifers are about equal.

The lower sedimentary subsystem is also referred to as the Sandy River Mudstone (PGG, 2012; Swanson et al., 1993). These deposits are divided into the following hydrogeologic units.

- Confining Unit 1 (CU1).

- Troutdale Sandstone Aquifer (TSA).
- Confining Unit 2 (CU2).
- Sand and Gravel Aquifer (SGA).

Confining Unit 1 is a regionally extensive sequence of silt and clay deposits that forms a major aquitard ranging from 50 to nearly 300 feet thick within the Portland Basin. Well logs often describe the clay soils as “sticky” indicating that the unit has high plasticity and is unlikely to contain secondary fracturing that would enhance vertical permeability. Drillers’ logs for deeper wells in the area indicate that CU1 is laterally continuous and has consistent soil and hydraulic characteristics (PGG, 2008). CU1 isolates groundwater flow in the upper sedimentary subsystem from groundwater flow in the lower sedimentary subsystem. Pump test observations reinforce the separation of hydraulic response above and below CU1. At the South Lake Wellfield, the thickness of CU1 is about 80 feet. The lower contact of CU1 may be locally interbedded with the lower units, but is identified in well logs as an interval of predominantly clay to silty clay with only minor intervals of sand or gravel. The upper contact is sharp, consistent with an unconformity against the overlying Troutdale Gravel Aquifer.

Hydrostratigraphic units beneath CU1 have been subdivided into three distinct units: the TSA, CU2 and SGA. In the Vancouver Lake Lowland, the TSA and SGA are both largely composed of fine sand, and there is less intervening silt and clay. It is, therefore, more difficult to differentiate between the units underlying the CU1 aquitard beneath the Vancouver Lake Lowlands. At the site, the water-bearing sands beneath the Vancouver Lake Lowland are collectively referred to as the Sand and Gravel Aquifer (SGA). CLARK currently operates two SGA supply wells at the site,

Natural recharge to the Vancouver Lake Lowlands comes from a real recharge derived from local precipitation and from groundwater flow from upland areas. PGG (2008) estimated areal recharge rates at approximately 6 inches per year (approximately 14% of average annual precipitation), with reduced recharge rates associated with paved areas. PGG estimated that about 29 cfs of recharge enters the Vancouver Lake Lowland as subflow from the adjacent uplands.

Due in part to the high transmissivity of the PAA, groundwater gradients in the upper sedimentary subsystem are relatively flat, particularly in the area west of the City of Vancouver. Water level measurements indicate that the PAA and the adjacent RAA respond rapidly to changes in Columbia River stage (PGG, 2008). These stage changes are caused by tidal influences and upstream dam releases. The observed rapid response between changes in river stage and corresponding changes in groundwater levels indicates that there exists a high interconnectivity between the river and both the PAA and the RAA. The combination of a flat groundwater gradient and tidal influences make estimating groundwater flow directions difficult using conventional methods.

SITE VISIT

On February 28, 2011, Roy Jensen of Hart Crowser met with Mr. Steve Prather of CLARK and visited the well site and the surrounding area. During the site visit, he observed topography, surficial hydrologic conditions, well locations and place of use, and discussed the project with the applicant representative.

WELL INFORMATION AND PUMPING TEST RESULTS

Hydrogeologic conditions at the South Lake Wellfield have been evaluated based on well drilling and testing completed in the PAA (TW-8) and the underlying SGA (TW-7) (PGG, 2008; Appendix B in Parametrix et al, 2008). The findings of these studies are summarized below.

- The PAA was encountered between 55 and 185 feet below ground surface (bgs) in Well TW-8, and from 65 to 180 feet bgs in Well TW-7.
- The PAA is overlain by recent alluvial deposits.
- The Troutdale Gravel Aquifer extends from 180 to 255 feet bgs.
- The Confining Unit 1 is approximately 100 feet thick.
- The TSA and SGA aquifers extend between 356 to 582 feet bgs.

In 2007, CLARK installed an initial supply well (TW-8) and completed a 3-day constant-rate aquifer test and a step-rate test to assess aquifer properties, well efficiency, and aquifer productivity (Parametrix et al., 2008). Baseline monitoring data collected before testing were used to correct water level changes induced by fluctuations in the nearby Columbia River and Vancouver Lake. The constant-rate test was conducted at an average rate of 5,110 gpm. Discharge water was routed through a 12-inch pipe approximately 800 feet north of the site and discharged into an enclosed bermed area. Groundwater, surface water, and barometric trends were monitored throughout the testing period. Groundwater levels were monitored at TW-8 and a network of seven observation wells that are completed in the RAA and PAA (TW-4, TW-5, TW-6, TW-2s, GW-4, GW-7 and "Winsell"). Gaging stations located at Vancouver Lake and the Columbia River were used to assess surface water trends. All of the groundwater level data sets were corrected for tidal variations.

Estimates of aquifer properties (transmissivity and storage coefficient) were obtained from the corrected drawdown and recovery curves based on early time drawdown and recovery trends. Water level responses were dominated by changes in pumping stresses during the first 100 minutes after the well was turned on or off. Later data were dominated by the Columbia River, which acts as a recharge boundary. Estimated transmissivity values range between about 900,000 and 2,300,000 ft²/d with an average value of about 1,800,000 ft²/d. The storage coefficient values ranged between 0.00025 and 0.00672 with an average value of about 0.0019. The aquifer behaved in a confined manner given the presence of the overlying silt deposits that occur within the upper portions of the RAA. Most of the drawdown plots for the observations wells showed recharge boundary effects from the Columbia River and, to a lesser extent, Vancouver Lake.

A three-day pumping test at TW-7 completed in the SGA did not produce any measurable drawdown within nearby PAA monitoring wells (PGG, 2008), demonstrating the hydraulic separation between the SGA and PAA due to Confining Unit 1.

Predicted Wellfield Capacity and Drawdown.

Pacific Groundwater Group (2012) used the "Vancouver Lake Lowlands Model" (Parametrix et al., 2008) to estimate drawdown in the PAA associated with a constant pumping rate of 25,000 gpm at the South Lake Wellfield. The model was developed for the Port of Vancouver. The modeling effort compiled available hydrogeologic information about the Vancouver Lake Lowland and incorporated this information into a detailed groundwater flow model. The South Lake Wellfield should be capable of pumping the desired instantaneous rate of 25,000 gpm based on a combination of aquifer testing and groundwater modeling observations outlined below.

- The constant-rate test showed about 8 feet of drawdown in the pumped well (TW-8) after 3 days of pumping at 5,110 gpm.
- The constant-rate test showed that water levels stabilize after about 2 hours of pumping due to the recharge boundary influences of the Columbia River and, to a very limited extent, by Vancouver Lake.
- The constant-rate test showed less than 0.5 feet of interference drawdown between the pumping well and PAA observation wells 100 feet away.
- Using the TW-8 well design as a model, a properly designed production well would likely include a pump chamber immediately above the top of the PAA (at 60 feet bgs) and provide about 50 feet of available drawdown.
- The model predicted that pumping five wells completed in the PAA at 5,000 gpm each would cause approximately 10 feet of drawdown in each well (8 feet of self-imposed drawdown and 2 feet of interference drawdown), thus amounting to a small portion of the available drawdown in the production wells. Spreading the 25,000 gpm total pumping rate over eight wells would further reduce the drawdown in each well.
- Pumping the wellfield at 25,000 gpm will cause a gentle but wide cone of depression that extends over the Vancouver Lake Lowland. Drawdowns beyond 1/2 mile of the wellfield are predicted to be less than 2 feet.

EXISTING WATER RIGHTS AND WATER WELLS NEAR THE PROPOSED SOUTH LAKE WELLFIELD

EXISTING SENIOR WATER RIGHTS

Based on information in Ecology's Water Right Tracking System (July 2012) there are 58 groundwater rights located within Sections 8, 9, 10, 15, 16, 17 T2N R1E. These include 14 certificated groundwater rights and 44 claimed water rights that lie within the search area. Given the available drawdown and the small amount of pumping drawdown (due to the high transmissivity of the aquifer) expected for a typical PAA well, 1 to 2 feet of interference drawdown is not expected to impair the ability of senior water right holders to obtain customary yields based on a properly completed well

PERMIT-EXEMPT WELLS

A review of Ecology well log files indicate that there are over 49 water wells completed within Section 8, 9, 10, 15, 16, and 17. There are no active water wells completed in the PAA within 1.5 miles of the wellfield site. Given the available drawdown and the small amount of pumping drawdown (due to the high transmissivity of the aquifer) expected for a typical PAA well, 1 to 2 feet of interference drawdown is not expected to impair the ability of senior water right holders to obtain customary yields based on a properly completed well.

WATER AVAILABILITY

Tests wells located in the proposed South Lake wellfield were tested at 5,110 gpm for 3 days with about 8 feet of drawdown. Based on the highly transmissive nature of the PAA (in which the wells will be screened), we conclude that water is available for appropriation in the requested quantity.

ENVIROMENTAL CONCERNS

The proposed South Lake Wellfield is located approximately 2 miles north of an industrial area where past land use activities have resulted in known soil and groundwater contamination. The following sites were identified based on known contamination and/or cleanup activities in the PAA and proximity to the proposed wellfield.

- Swan Manufacturing Company (SMC)
- Cadet Manufacturing Company (Cadet)
- NuStar Energy LP, formerly ST Services (ST Services)
- NuStar Energy LP Tank Farm (NuStar Tank Farm).

As described in the following paragraphs, none of the identified sites poses an environmental concern for the South Lake Wellfield.

SMC AND Cadet Sites

The SMC site (2001 and 2501 W. Fourth Plain Boulevard) is located about 1.5 miles south of the South Lake Wellfield and 0.5 miles north of the Columbia River. Swan Manufacturing, a baseboard heater manufacturer, had operated at the site from 1956 to 1964. It was discovered in 1997 that trichloroethylene (TCE) contamination was present in soil at the manufacturing site and had reached groundwater. During investigations at the SMC site, groundwater contaminated with TCE and tetrachloroethylene (PCE) was also discovered at the nearby Cadet site located at 2500 W. Fourth Plain Boulevard. Cadet had purchased the heater manufacturing operation from Swan in 1972. The Port of Vancouver (Port) purchased the SMC site in 1982 and the Cadet site in 2006.

Investigations performed by the Port indicate that groundwater quality in the RAA and PAA has been impacted with TCE originating at the SMC and Cadet sites, as well as the ST Services site (see below). Historically, groundwater flow in the RAA and PAA near these sites has been strongly influenced by pumping wells used by the Great Western Malting Company (GWM) and the Port. In response to pumping, the plumes originating from the SMC and Cadet sites have migrated to the east and south. (The plume originating at ST Services site migrates north toward the SMC site.) East of the SMC site, the three plumes commingle. Groundwater extracted by GWM wells is treated to remove TCE. Since June of 2009, the Port has continuously operated a groundwater extraction well on the SMC site as part of a Groundwater Pump and Treatment Interim Action (GPTIA). The well has operated at an average rate of 2,500 gpm.

The interim actions (Ecology 2011) have been successful in cleaning up the contaminant plumes from the SMC/Cadet sites. Treatments are reducing contaminant levels and the size of the groundwater TCE plume. Overall, levels of TCE and associated compounds continue to decline in response to treatments. The pump and treat system is also containing the groundwater plume. Groundwater modeling (Parametric et al., 2008) suggests that extracted water from the GPTIA will reach non-detect concentrations in less than five years of additional operation due to the large volume of water pumped and the mixture of groundwater from contaminated and clean areas within the capture zone. The results of modeling show that pumping from the South Lake wellfield will cause little or no hydraulic interference with the pump and treat system and that containment of the contaminant plumes will continue when the South Lake wellfield is fully operational.

ST Services Site

The ST Services site is located at the Port of Vancouver Terminal #2, 2565 NW Harborside Drive in Vancouver. ST Services (now NuStar Terminals Services, Inc., a subsidiary of NuStar Energy L.P.) has operated the site as a shipping terminal along the Columbia River since 1998. The terminal receives, stores, and transfers bulk chemicals, jet fuel and methanol. The Port of Vancouver owns the property and leases it to NuStar. Before 1998, the terminal was owned and operated by GATX. During GATX ownership, contamination of soil and groundwater was discovered on site. Initial investigations to determine the type and extent of contamination found several contaminants above state cleanup levels including the chlorinated solvents PCE and trichloroethylene (TCE). Chlorinated solvents have not been handled on the site since at least 1994. NuStar submitted a revised RI to Ecology in October 2009, a draft FS in January 2010, and an Interim Action Work Plan in March 2011. Remediation at the site currently includes soil vapor extraction to remove volatile organic compounds from soil and enhanced bioremediation to treat contaminated groundwater.

Groundwater contamination from the ST Services site occurs in the shallow and intermediate portions of the PAA. Much of the contamination in the shallow zone discharges southward to the Columbia River. Contamination that reaches the intermediate zone largely migrates to the northeast to commingle with the SMC/Cadet plume. While the commingled plume was historically captured by pumping at GWM, operation of the Port's GPTIA extraction well on the SMC site will provide a large portion of current and future capture. The results of modeling (Parametric et al., 2008) shows that containment of the plume from the ST Services site by the existing pump and treatment system will continue even when the South Lake wellfield is fully operational.

ST Services- NuStar Tank Farm

The NuStar Tank Farm is located at 5420 NW Fruit Valley Road, about 600 feet south of the South Lake Wellfield. The site has been used for storing and handling petroleum products since 1957. In 2001, then-owners Cenex discovered evidence of petroleum-contaminated soils while shutting down an underground gasoline vapor recovery tank. Also in 2001, a gasoline spill from an underground storage tank was reported to Ecology. Benzene and other petroleum chemicals were documented in groundwater at levels above state cleanup standards.

Ecology and NuStar Terminals Operations Partnership L.P. (a subsidiary of NuStar Energy L.P.) entered into an Agreed Order (legal agreement) in 2008 to begin the site cleanup process. At that time, it was confirmed that contaminants are within the boundaries of the NuStar property. A site remedial investigation was approved by Ecology in June 2011, and a feasibility study will be submitted to Ecology in 2012. Levels of contaminants have decreased significantly since their discovery. All contaminant concentrations, except for MTBE, have declined to below maximum contaminant levels (MCLs). MTBE has been detected in a monitoring well north of the contaminant source location at concentrations ranging from 15 to 80 ug/l (MCL = 20 mg/l). Ecology considers the contaminant concentrations to be sufficiently low that cleanup activities will not be warranted. MTBE, the only contaminant exceeding its MCL, is expected to degrade and disperse to concentrations below the MCL before CLARK's development of the South Lake Wellfield. Due to low concentrations and natural attenuation, contaminants from the NuStar Tank Farm will not impair operation of the South Lake Wellfield.

RATIONALE FOR WATER RIGHT APPLICATION

It is Ecology's goal that decisions on new water right applications in Clark County be consistent with the watershed planning process and recommendation of the WRIA 27/28 Planning Groups. The Watershed Management Plan adopted for WRIA 27/28 addresses a range of issues related to water resources, including water supply, stream flow management, water quality, and fish habitat. The WRIA 27/28 Planning Group views the Columbia River and groundwater in hydraulic continuity with the Columbia River as a major water resource to meet water supply needs. As new water supplies are needed, it is preferable they be withdrawn from the Columbia River, adjacent lowland reaches of tributaries subject to tidal effects, and/or associated groundwaters, rather than from flow-limited reaches of streams tributary to the Columbia. This approach can meet regional supply needs, while protecting important aquatic habitat in the region.

CLARK has developed 50-year water demand projections based on a range of population forecast assumptions (CH2M Hill, 2010). The shallow PAA aquifer at CLARK's South Lake Wellfield will be used as a major regional supply source to meet the combined needs of CLARK and the cities of Battle Ground and Ridgefield. Projected average day water demand (ADD) for all three entities is expected to increase from about 14.21 mgd in 2011 to as much as 40.45 mgd in 2060.

IMPAIRMENT TO EXISTING WATER RIGHTS

The proposed use does not impact exempt wells, senior water rights, or surface water rights in the area.

BENEFICIAL USE

The proposed use is considered to be beneficial under RCW 90.54.020(1).

PUBLIC INTEREST CONSIDERATIONS

No detriment to the public interest was identified in evaluating this application.

CONCLUSIONS

In accordance with chapters 90.03 and 90.44 RCW, we find that there is water available for this beneficial appropriation from the source in question and that the appropriation as authorized will not impair existing rights or be detrimental to the public interest. Therefore, a permit should be issued, subject to the above-indicated provisions.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that the Application No. G2-30482 be authorized, in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial.

- 25,000 gallons per minute (Qi);
- 20,000 acre-feet per year (Qa); and
- For municipal water supply.

Point of Withdrawal

Up to 8 wells located on SE 1/4 of Section 9, NW 1/4 of Section 16, SW 1/4 of Section 9, NE 1/4 of Section 16, all in T2 N., R1 E.W.M.

Place of Use

As described on Page 1 of this Report of Examination.

Reviewed by: Phil Crane 9/21/2012
Phil Crane, Water Resources Program Date